



The developmental delay in children 4 to 24 months referred to health centers

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Abstract

Infants' development is a dynamic process that has multiple stages. Disorders of growth and development are as one of the most common problems in the process of infant development. This study aimed to determine the developmental level of infants less than two years who were referred to the health care centers of Kurdistan University of Medical Sciences, Iran. This study was descriptive cross-sectional which was done on 397 infants 4-24 months of systematic sampling by standard age & stages questionnaires. The prevalence of developmental delay in infants 4 to 24 months on average was 4.8; 203 girls and 194 boys, in other words 3.9 and 5.7 percent have developmental delay. The prevalence of developmental delay was 11.4% in 4 months infants in 4 domains, 5.7% in 6 months infants in two domains, 34.4% in 18 months infants in three domains, and 5% in 24 months infants in 1 domain. According to this study, the developmental delay was in an acceptable level, however, it increased dramatically at the age of 18 months. The highest level of developmental delay was observed in fine motor. Parental training and encouraging primary care providers such as family physicians and pediatricians can increase early detection and reduce prevalence developmental delay in infants.

Keywords: Child, Delay, Developmental, Health Center

Introduction

Developmental delay is term used for infants who do not behave like what is expected for their age [1]. American Academy of Pediatrics (AAP) announced that developmental disorders is one of the most common problems in child's growth process [2]. Infant growth is dynamic process that has different stages that include

development of gross motor, fine motor, communication and personal-social abilities [3]. In general population, two per 1000 infants suffer from developmental delay [2]. The prevalence of developmental delay is 16% in infants which is much higher than general population's prevalence [1,4]. Developmental delay had an increase of 63% in American

infants between the years 1997-1998 and 2000-2001[5]. However, Aliakbari's study showed an 18.7% developmental delay in children in Isfahan [2] and in a study in India 46/8% [6] and in a study in Ghana 44/6% of infants have type of development delay [7]. Proximately, 10-20% of parents concern about infants' growth, gross motor and fine motor, and kinetic skills and quarter of parents worry about their infants' eating disorders [5,8]. Developmental delay identification is very difficult in early childhood because they have big variety of behaviors [4]. Despite using clinical judgments in order to identify children with developmental problems only 20% to 30% of them are diagnosed before school age [3,4,9]. In particular, mild to moderate impairments are diagnosed with a great delay and they are detected only in the first few years of life, when the problems has severely developed [10]. Infants with developmental delays in comparison of infants in the same age[11] suffer more emotional and behavioral problems, stuttering or other learning difficulties, anxiety, and depression[5]. Most of them refer to health centers, but only 30% of infants are diagnosed at this center [12,13]. These infants would make a lot of difficulties for their family and society [1] such as; adverse effects on family relationships, friendships and expenditures due to this developmental delay [5]. Developmental evaluation in early ages have many benefits for rest of their life periods; early detection and timely intervention can be timely treated [14] which its advantages is much more than its difficulties[15]. Therefore, timely diagnose and referral of developmental delays will reduce its negative effects and consequences [2,4].

Infants' growth and developmental difficulties surveillance and screening importance is largely known and entered in pediatrics guidelines [15,16]. 'Ages and Stages Questionnaire' is an appropriate tool for screening [4] whose validity and reliability has been confirmed by several studies [17]. Risk factors affecting developmental delay identification even before population's screening (especially in Iran, where physicians are not familiar with

screening and neurologic developmental diagnosis examination) will give a great help to recognize the impairments in the early stages. The early diagnosis and rehabilitation of children's problem not only reactivates their developmental skills and prevents disabilities, but also eliminates emotional and commercial burdens for themselves and their families[2]. Regarding to lasting effects of developmental disorders on infants' live and having limited studies in this scope, this study was conducted by the purpose of determining developmental levels of under 2 years old infants in Sanandaj city in 2009.

Method

According to this cross-sectional study, developmental disorders prevalence was 10% (according to a pilot study in Sanandaj, the west of Iran), type I error of 5%, and a precision of 3%. The sample size was determined as 397 children (4-24 months) being under Sanandaj's health centers coverage in 2009. The proportion of participants in each health center (22 centers in Sanandaj) was determined based on the number of infants that covered by the facility, and then infants were systematically chosen out of each center to reach the required sample size. Proportion of each center out of sample size was determined according to the population of infants under the coverage of each health center (22 centers in Sanandaj city) and each center's infants were chosen to reach the required sample size.

Data was collected by Ages and Stages Questionnaire (ASQ), whose validity has been confirmed by numerous worldwide studies. In the experiments conducted by Welfare and Rehabilitation faculty during 2002-2007 in Iran, the validity, reliability and ability of the questionnaire to detect disorders were reported as 84%, 94%, and 94%[17]. The questionnaire consists of five parts: 1. Communication part, 2. gross motor part, 3. fine motor part, 4. Problem Solving part, 5. Social-personal part.

Parents were informed after choosing

their infants for the study (based on age appropriateness for each questionnaire appropriateness), and were asked to give permission to complete the questionnaire. The questionnaire was completed by parents. In case of parents' illiteracy, the questionnaire was read and completed for them by one of their family members. For infants who were born three weeks or more earlier, questionnaires were completed according to its special guideline [18] adjusted age was used in questionnaire completing until the infant reaches to 2 years old, adjusted age is calculated by reducing prematurity weeks out of the current age. For all the questions, 10 points was attributed to "yes" answers, 5 points for answering "sometimes", and zero point for answering "not yet". All the scores were summed up and compared with questionnaire's cut-off point. If the total score

in each developmental domain was lower or equal to cut off point, the infant was referred for further evaluations and follow ups. Data were described by frequency and percentage, using SPSS13 software. All data were analyzed by Fisher's exact test ($p < 0.05$ was considered as significant level).

Results

By means of developmental level determination in fewer than 2 year infants, 397 patients were examined in this study. Among them, 203 patients were girl and 194 patients were boys with the median age of 14 months. Developmental delays prevail 3.9 people in girls and 5.7 in boys; there was no significant relation between gender and developmental delay (Table 1).

The average prevalence of developmental

Table 1: *Developmental status comparing of studied infants based on sex and in different ages*

Ages per month	Male				Female				Significance level
	Normal		Preterm		Normal		Preterm		
	N	%	N	%	N	%	N	%	
4	15	83.3	3	16.7	15	93.8	1	6.3	0.60
6	16	100	0	0	17	89.5	2	10.5	0.48
8	17	100	0	0	18	100	0	0	-
10	16	100	0	0	19	100	0	0	-
12	18	100	0	0	16	100	0	0	-
14	18	100	0	0	19	100	0	0	
16	18	100	0	0	18	100	0	0	
18	11	61.1	7	38.9	10	71.4	4	28.6	0.71
20	20	100	0	0	19	100	0	0	
22	20	100	0	0	20	100	0	0	
24	14	93.3	1	6.7	24	96	1	4	1
Total	183	94.8	11	5.7	195	96.1	8	3/9	

delay was 11.8 in four month infants, 5.7 in six month infants, 34.4 in 18 month infants, and 5% in 24 month infants; there was no developmental delay in the other groups. Most developmental delay among boys was in 18 months and the lowest among girls was in 24 months, 38.9% and 4% respectively. Four month year old infants had developmental delays, one infant in communication domain

(2.9%), two in gross motor domain (5.8%), three in problem solving domain (8.8%), and one in personal-social domain (2.9%). Six month year old infants having developmental delays were two in fine motor domain (5.7%) and one in problem solving domain (2.8%). Developmental delays were seen in 18 month year old infants, three in communication domain (9.3%), seven in fine motor domain

(21.78%) and four in problem solving domain (12.5%). Twenty-four month year old infants having developmental delays were two in fine motor domain (5%). There was no delay in other groups. The maximum developmental delay was observed in 18 month year old boys in fine motor domain. Most delays were in fine motor development area at the age of 18 months and

the least were in communication and social personality area. Overall, developmental delay was observed in four infants in communication domain (1%), four infants in gross motor domain (1%), 11 infants in fine motor domain (2.7%), seven infants in problem solving domain (1.9%), and one infant in personality domain (0.25%) (Table 2).

Table 2: *Developmental disorders distribution in different domains based on age group Fisher exact test was used to analysis in each age.*

Age per month	Communication		Gross motor		Fine motor		Problem solving		Social-personal	
	N	%	N	%	N	%	N	%	N	%
4	1	2.9	2	5.8	0	0	3	8.8	1	2.9
6	0	0	0	0	2	5.7	1	2.8	0	0
8	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0
18	3	9.3	0	0	7	21.87	4	12.5	0	0
20	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0
24	0	0	2	5	0	0	0	0	0	0
Total	4	1%	4	1%	9	2.7%	8	2	1	0.025%

Discussion

Results of the current study were shown after study on 379 infants aging 4 to 24 months; the development delay was 4.8%. Most developmental delays were seen among 18 month year old boys in fine motor domain and there was a significant relationship between gender and developmental delay. Researchers believed that living conditions during infancy and early childhood have significant impact on infants’ later development. Infants and children with physical or environmental problems need special care to reach to proper developmental stages. They are more affected by developmental disorders and developmental delay which in turn lead to different types and levels of mental, kinetic, oral, auditory and visionary disabilities. Early diagnosis and intervention are necessary to avoid these problems and to prevent delay and disabilities[18].

Physical growth, skills development, and mental organizing occur quickly during the first year of

life. These changes evolve the quality of the infant's behavior and social communication skills. Games and activities such as painting, music, playing with woods and water will develop the child's creativity and experience. These games provide a good atmosphere for infants to make enough experiences and increase his handcraft skills [19].

According to 2 studies which were conducted by Aliakbari in Iran, infants’ developmental delay was reported as 18% and 22.4% [2,20] and developmental delay was determined 44.6% and 46.8% in studies which were done in Ghana and India , [7, 21]. In this research, developmental delay was 4.8%, the difference may be due to other factors such as anemia, high risk pregnancies, and ages differences among infants. According to studies, these differences maybe related to environmental and cultural differences, as well as social and economic factors [7,21,22]. In the current study 11.8% of four month year old infants had developmental disorders with the highest

frequency in problem solving domain, which is probably due to that most of less than six month infants who are mostly close to their mothers, are not usually taken to nursery.

Developmental disorder prevalence have decreased to 5.7% in six month year old infants and it has remained low until the age of 18 months; at this age, it has shown increases to 34.4 mainly in fine motor domain. Frequency of different disorder domains was less than 10%, but it has reached to 30% in this age group. The turning point is 18 month year old infant communication and child communication is too variable in Rydz's study, infants show 40 to 60 percents of variation in their performance in 3 month intervals that is temporary and observed more in 18 month year old infants due to the critical point for infants' communication and most of contacts are happened in this age [9]; these findings are parallel to our study's results. There has been no significant relation between gender and developmental delay in this study that is similar to Sajedi's study findings[17]. According to the findings of Richer's study in Norway, the girls' average developmental levels were higher than boys [23]. In Suleiman's study, sex was significantly related to developmental delay[20]. This might be originated from the other variables influencing developmental delay measurement, like anemia. ASQ is designed only for ages and stages assessments, it seems better to design two separate questionnaires for each sex or to allocate a special time period for each ASQ. The main challenge for early detection of developmental disorders in infants is that infant development process has dynamic nature for example it is constantly evolving and gets more completed and complicated; as more, although developmental process has predictable and similar trend on most infants, there are still lots of significant differences in every individual infant. Also, it should be considered that developmental disorder does not occur only at certain periods of life and infants may expose some problems at any ages. Parents' possess the richest information sources for their infant's development status and if we ignore this fact, we may face lots of deficiency

in infants' developmental level determination. On the other hand, parent's involvement in infant's activities assessment may provide important information about their infant's development for them; consequently they will have proper and rational expectations about their infant.

Infant's health assessment requires reliability and costs beneficial methods [3,9,24] as the infants' parents intend directly to fill out questionnaires and they would like to cooperate in next steps, data's validity was high. Parents' access to primary care providers such as family physicians and pediatricians providing an opportunity is another positive point to evaluate infant development and making it possible to identify developmental delay in the best time. In addition, it encourages physicians to apply ASQ, which provides quicker detection of developmental delay with lower costs. One of the most important limitations of this study was the lack of similar developmental complement studied in the world by using ASQ questionnaire that make it difficult to explain and compare results. Besides, this limitation makes it difficult for people to complete the questionnaire.

In period of growth time, infants may be influenced by different factors. Therefore it is recommended to do developmental assessments in appropriate time intervals and periods.

Conclusions

Due to the lack of similar exclusive studies on infants' developmental delays in Iran, and the level of developmental delay as 16% in the current study, we concluded that under 2 year old infants' developmental delay prevalence has an acceptable range. Nevertheless prevalence rate of this delay could be reduced when we train parents, for early detections screen and use ASQ.

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Contributions

Study design: AF, MH, EN, F Gh

Data collection and analysis: AF, MH, E N, AF, F Gh

Manuscript preparation: AF, MH, AF

Conflict of interest

"The authors declare that they have no competing interests."

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